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## Growth performance of nursery pigs fed biosaf in combination with in-feed antimicrobials

### Abstract

Weaned pigs (n = 240; initial BW 13.5 lb) were used in a 28-d growth study. Pigs were blocked by sex and BW, and were assigned randomly to 1 of the 5 dietary treatments: control (no added antimicrobials or yeasts), Neo- Terramycin4 (Neo-Terra; control diet plus Neo-Terra), Denagard5 (control diet plus Denagard PLUS), Neo-Terra+BIOSAF (control diet plus Neo-Terra and 0.15% BIOSAF yeast), or Denagard+BIOSAF (control diet plus Denagard and 0.15% BIOSAF yeast). There were 8 pens per treatment and 6 pigs per pen. Treatments were applied in both Phase 1 (d 0 to 14) and Phase 2 (d 15 to 28) diets. Overall (d 0 to 28), pigs fed Denagard+ BIOSAF had greater ( $P<0.05$ ) ADG than all other treatments, and pigs fed Neo-Terra, Denagard, and Neo-Terra+BIOSAF had greater ( $P<0.05$ ) ADG than did pigs fed the control diet. For the entire trial, pigs fed Denagard+ BIOSAF also had greater ( $P<0.05$ ) ADFI than did pigs fed the control diet or diet containing Neo-Terra, but had ADFI similar to that of pigs fed Denagard and Neo-Terra+BIOSAF. Over the entire 28-d experiment, pigs fed Denagard+BIOSAF maintained greater ( $P<0.05$ ) F/G than did pigs fed the control diet and diet containing Denagard. But F/G was similar between pigs fed Denagard+ BIOSAF, Neo-Terra+BIOSAF, and Neo-Terra. In summary, BIOSAF fed in combination with Denagard enhanced the growth response of nursery pigs beyond the growth advantage of Denagard alone. The interaction of BIOSAF with Denagard is generally consistent with other reports, although we anticipated that BIOSAF would also improve the response to Neo-Terra, as we had observed previously. Factors affecting the presence and magnitude of the interaction of BIOSAF and in-feed antibiotics to enhance the growth response in nursery pigs remain to be elucidated.; Swine Day, 2006, Kansas State University, Manhattan, KS, 2006

### Keywords

Kansas Agricultural Experiment Station contribution; no. 08-83-S; Swine day, 2006; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 966; Yeast; Antimicrobials; Denagard; Neo-Terra; Nursery pigs; Swine

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## GROWTH PERFORMANCE OF NURSERY PIGS FED BIOSAF<sup>1</sup> IN COMBINATION WITH IN-FEED ANTIMICROBIALS<sup>2</sup>

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### Summary

Weaned pigs (n = 240; initial BW 13.5 lb) were used in a 28-d growth study. Pigs were blocked by sex and BW, and were assigned randomly to 1 of the 5 dietary treatments: control (no added antimicrobials or yeasts), Neo-Terramycin<sup>4</sup> (Neo-Terra; control diet plus Neo-Terra), Denagard<sup>5</sup> (control diet plus Denagard PLUS), Neo-Terra+BIOSAF (control diet plus Neo-Terra and 0.15% BIOSAF yeast), or Denagard+BIOSAF (control diet plus Denagard and 0.15% BIOSAF yeast). There were 8 pens per treatment and 6 pigs per pen. Treatments were applied in both Phase 1 (d 0 to 14) and Phase 2 (d 15 to 28) diets. Overall (d 0 to 28), pigs fed Denagard+BIOSAF had greater (P<0.05) ADG than all other treatments, and pigs fed Neo-Terra, Denagard, and Neo-Terra+BIOSAF had greater (P<0.05) ADG than did pigs fed the control diet. For the entire trial, pigs fed Denagard+BIOSAF also had greater (P<0.05) ADFI than did pigs fed the control diet or diet containing Neo-Terra, but had ADFI similar to that of pigs fed Denagard and Neo-Terra+BIOSAF. Over the entire 28-d experi-

ment, pigs fed Denagard+BIOSAF maintained greater (P<0.05) F/G than did pigs fed the control diet and diet containing Denagard. But F/G was similar between pigs fed Denagard+BIOSAF, Neo-Terra+BIOSAF, and Neo-Terra. In summary, BIOSAF fed in combination with Denagard enhanced the growth response of nursery pigs beyond the growth advantage of Denagard alone. The interaction of BIOSAF with Denagard is generally consistent with other reports, although we anticipated that BIOSAF would also improve the response to Neo-Terra, as we had observed previously. Factors affecting the presence and magnitude of the interaction of BIOSAF and in-feed antibiotics to enhance the growth response in nursery pigs remain to be elucidated.

(Key Words: Yeast, Antimicrobials, Denagard, Neo-Terra, Nursery Pigs.)

### Introduction

Results from previous studies indicate that yeast may interact with in-feed antibiotics to stimulate growth performance in nursery pigs

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<sup>1</sup>BIOSAF is a registered trademark of SafAgri, Minneapolis, MN.

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<sup>3</sup>Food Animal Health and Management Center, College of Veterinary Medicine.

<sup>4</sup>Neo-Terramycin is a registered trademark of Phibro Animal Health, Ltd., Regina, Saskatchewan, Canada.

<sup>5</sup>Denagard is a registered trademark of Novartis Animal Health, Greensboro, NC.

to a greater extent than antibiotics alone. But these effects may be dependent on differences in yeast cultures, processing, and yeast activity, as well as the specific antimicrobial used.

BIOSAF is a heat-stable yeast product of *Saccharomyces cerevisiae*. Pigs fed BIOSAF at 0.15% in combination with Neo-Terra produced greater ADG and ADFI than that of pigs fed a diet without antibiotics, and showed numerically greater ADG than pigs fed Neo-Terra (2004 KSU Swine Day Report). The objective of the current experiment was to further evaluate the interactive effects of feeding antimicrobials in combination with BIOSAF yeast in nursery pig diets.

**Table 1. Basal Diet Composition (As-fed Basis) %<sup>a</sup>**

Ingredient	Days of Experiment	
	0 to 14	15 to 28
Corn	47.50	55.95
Soybean meal, 46.5%	27.00	37.40
Choice white grease	3.00	3.00
Monocalcium phosphate, 21% P	0.80	1.40
Limestone	0.50	1.00
Salt	0.20	0.30
Vitamin premix	0.25	0.25
Trace mineral premix	0.15	0.15
L-threonine	0.15	0.15
Lysine-HCl	0.30	0.30
DL-methionine	0.15	0.13
Select menhaden fish meal	5.00	0.00
Spray dried whey	15.00	0.00
Total	100.00	100.00

<sup>a</sup>Corn was removed from the basal diet and replaced with Neo-Terra (0.7%), Denagard (35 g Tiamulin, 400 g CTC/ton), and BIOSAF (0.15%) to achieve the appropriate experimental diets detailed in the Procedures.

## Procedures

A total of 240 weaned pigs (initial BW 13.5 lb) were used in a 28-d study to determine the growth effects of BIOSAF yeast fed in combination with the anti-microbials Neo-Terra or Denagard. Pigs were blocked by weight and sex, and were assigned randomly within block to 1 of 5 dietary treatments: control (no added antimicrobials or yeasts), Neo-Terramycin (Neo-Terra; control diet plus Neo-Terra), Denagard (control diet plus Denagard PLUS), Neo-Terra+BIOSAF (control diet plus Neo-Terra and 0.15% BIOSAF yeast), or Denagard+BIOSAF (control diet plus Denagard and 0.15% BIOSAF yeast). There were 6 pigs per pen and 8 pens per diet. Phase 1 diets were fed from d 0 to 14, and Phase 2 diets were fed from d 15 to 28. All diets were formulated without growth-promoting concentrations of copper sulfate or zinc oxide.

During each week of the experiment, ADG, ADFI, and F/G were calculated by weighing pigs, feed added, and feeders.

## Results and Discussion

Overall (d 0 to 28), pigs fed Denagard+BIOSAF had greater ( $P<0.05$ ) ADG than did pigs fed the other four diets. In addition, pigs fed Neo-Terra, Denagard, and Neo-Terra+BIOSAF had greater ( $P<0.05$ ) ADG than that of the pigs fed the control diet. But pigs fed Neo-Terra+BIOSAF and pigs fed Neo-Terra alone performed similarly. Overall, ADFI was similar for pigs fed Denagard+BIOSAF, compared with those fed Denagard and Neo-Terra, but was greater ( $P<0.05$ ) than that of pigs fed the control or Neo-Terra. Pigs fed the Denagard+BIOSAF diet had improved ( $P<0.05$ ) F/G, compared with pigs fed either the control diet or the Denagard diet during the 28-d experiment. The F/G for pigs fed the Denagard+BIOSAF diet was similar to the F/G of pigs fed Neo-Terra and Neo-Terra+BIOSAF.

The results of this trial indicate that the addition of BIOSAF to diets containing Denagard improved ADG of nursery pigs beyond the growth response achieved by feeding Denagard alone. Pigs also responded with increased growth performance to addition of Neo-Terra, but the addition of BIOSAF did not enhance this response as we had observed

in a previous trial. Thus, the addition of BIOSAF has the potential to enhance the growth response to in-feed antibiotics, but the response has not been consistent across trials. The factors contributing to enhancement of the antibiotic-stimulated growth response remain unclear.

**Table 2. Growth Performance of Nursery Pigs Fed Diets Containing In-feed Antibiotics With, and Without, Added BIOSAF Yeast<sup>a</sup>**

	Treatments <sup>b</sup>					SEM	P Value
	Control	Neo-Terra	Denagard	Neo Terra + BIOSAF	Denagard + BIOSAF		
d 0 to 14							
ADG, lb	0.43 <sup>c</sup>	0.51 <sup>d,e</sup>	0.47 <sup>c,d</sup>	0.48 <sup>c,d</sup>	0.57 <sup>e</sup>	0.01	0.01
ADFI, lb	0.55 <sup>c</sup>	0.57 <sup>c</sup>	0.62 <sup>d,e</sup>	0.58 <sup>c,d</sup>	0.64 <sup>e</sup>	0.01	0.005
F/G	1.28 <sup>c</sup>	1.12 <sup>d</sup>	1.32 <sup>c</sup>	1.21 <sup>c,d</sup>	1.12 <sup>c</sup>	0.03	0.02
d 15 to 28							
ADG, lb	1.20 <sup>c</sup>	1.29 <sup>d</sup>	1.31 <sup>d</sup>	1.34 <sup>d</sup>	1.37 <sup>d</sup>	0.02	0.01
ADFI, lb	1.78 <sup>c</sup>	1.85 <sup>c,d</sup>	1.87 <sup>d</sup>	1.92 <sup>d</sup>	1.92 <sup>d</sup>	0.02	0.03
F/G	1.48	1.43	1.43	1.43	1.40	0.01	0.3
d 0 to 28							
ADG, lb	0.82 <sup>c</sup>	0.90 <sup>d</sup>	0.89 <sup>d</sup>	0.91 <sup>d</sup>	0.97 <sup>e</sup>	0.01	0.0005
ADFI, lb	1.16 <sup>c</sup>	1.20 <sup>c,d</sup>	1.25 <sup>d,e</sup>	1.25 <sup>d,e</sup>	1.28 <sup>e</sup>	0.01	0.004
F/G	1.41 <sup>c</sup>	1.33 <sup>d</sup>	1.40 <sup>c</sup>	1.37 <sup>c,d</sup>	1.32 <sup>d</sup>	0.01	0.005

<sup>a</sup>A total of 240 pigs (6 pigs per pen and 8 pens per diet).

<sup>b</sup>Control = diet containing no added antibiotic or yeast; Neo-Terra = diet with 140 g/ton neomycin sulfate and 140g/ton oxytetracycline HCl; Denagard = diet with 35 g Tiamulin, 400 g CTC/ton; Neo Terra + BIOSAF = Neo-Terra diet with BIOSAF at 0.15 %; Denagard + BIOSAF = diet with Denagard with BIOSAF at 0.15 %.

<sup>c,d,e</sup>Means in the same row without a common superscript differ (P<0.05).